A NEW SPECIES OF *APHAENOGASTER* (HYMENOPTERA: FORMICIDAE) FROM UPLAND HABITATS IN FLORIDA

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ABSTRACT: *Aphaenogaster umphreyi*, n. sp., is described from sandy uplands of peninsular Florida. It appears to be closely related to *A. fulva* Roger. The new species, which may be entirely subterranean in habits, is characterized by unusually small eyes, coarse sculpture, short propodeal spines, and unusually small hind tibial spurs.

The genus *Aphaenogaster* tends to accumulate taxonomic problems. A number of species show conspicuous variation between populations, within populations, and even within colonies, while camouflaged in this tangle of intraspecific variation are cryptic species that can only be detected by the most sophisticated methodology, such as that used by Umphrey (1996) for the *A. rudis* group. One species that emerged some time ago from the taxonomic thicket is *A. fulva* Roger, which, once divested of the set of "varieties" that are now recognized as the *rudis* group, seemed to be a single, easily recognized species (Creighton, 1950). It now appears that there is a second species that shares most of the features previously ascribed solely to *fulva*. Fortunately, since this species is rare, or at least difficult to find, it is unlikely to have been the basis of many (if any) published records of *fulva*.

Aphaenogaster umphreyi, Deyrup and Davis, NEW SPECIES

Figure 1

Description: Holotype worker measurements (mm): head length (anterior edge of clypeus to occiput) 1.15; head width (above eyes): 0.95; malar space (= distance from lower edge of eye to mandible in lateral view): 0.38; length of eye: 0.15; distance from propodeal spiracle to tip of propodeal spine: 0.31.

In frontal view, head with convex vertex; coarse reticulate rugae covering dorsum and sides of head, including occiput; venter of head with prominent carinae diverging from midline. Mandible, antenna, and clypeal area resembling those of *fulva* (cf. Figs. 1 and 2).

Mesosoma with strongly raised rugae on the pronotum, mesonotum, and propodeum, these rugae zigzagging, not smoothly undulating, except less elevated and more undulating on pronotal disc. Propodeal spine short, compared to that of *fulva* (Fig. 2), strongly upturned, approaching a right angle with long axis of propodeum. Legs generally similar to *fulva*, including transverse ridges on front coxae, except hind and middle tibial spurs reduced, shorter than width of basitarsus on respective legs.

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[1] Received June 6, 1997. Accepted August 30, 1997.

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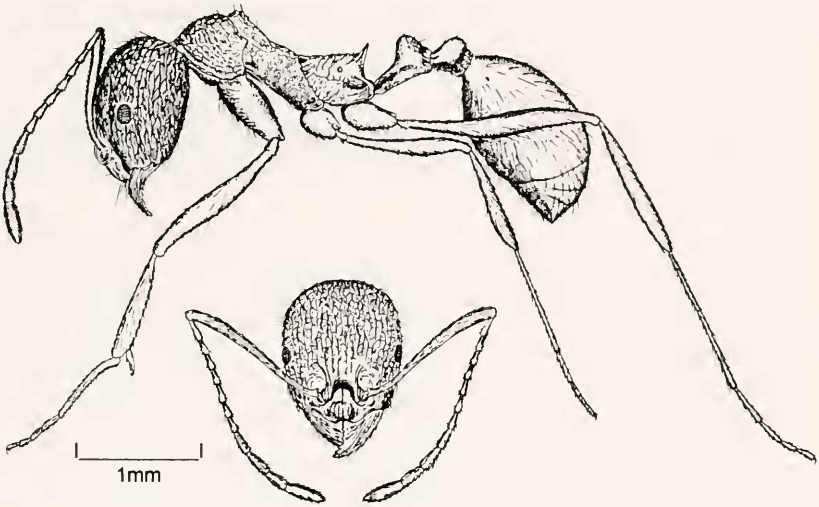

Figure 1. *Aphaenogaster umphreyi*, new species, worker.

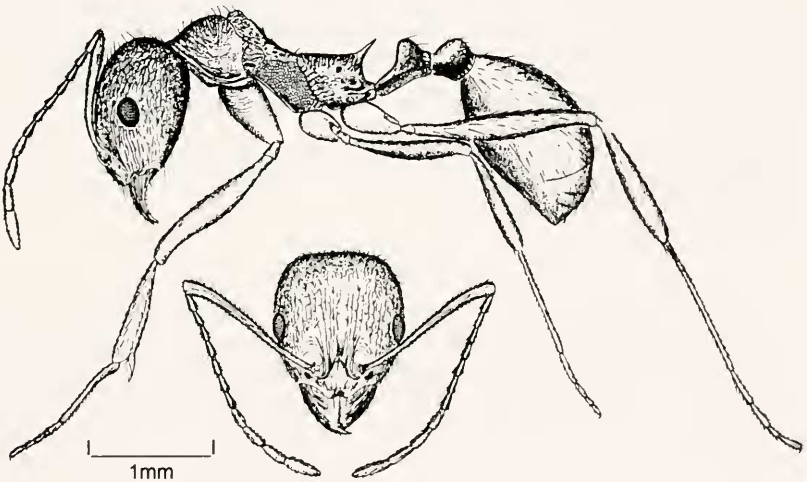

Figure 2. *Aphaenogaster fulva*, worker, Florida specimen.

Petiole and gaster similar to *fulva* (cf. Figs. 1 and 2), except petiole with more conspicuous rugae.

Color reddish brown, legs and gaster yellowish brown.

Diagnosis. Similar to *A. fulva*, but differs in having much smaller eyes, shorter propodeal spines, coarser and more extensive sculpture on the head and mesosoma, more convex vertex in frontal view, and reduced hind tibial spurs (compare Figs. 1 and 2).

Type material. Holotype worker: FLORIDA, Putnam Co., 3 miles east of Melrose, 20 Aug. 1995 (Lloyd R. Davis), Ordway Preserve, sandhill habitat, nest in ground, at base of small oak; deposited in Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

Paratypes: FLORIDA: 22 workers from nest series of holotype; same site and collector as holotype: 1 worker: 1 Oct. 1995; 1 worker: 24 Feb. 1995; 1 worker: 27 Aug. 1995; 1 worker: 6 Sept. 1996; 2 workers: 14 Sept. 1996; 2 workers: 3 Mar. 1995. One worker: Highlands Co., Archbold Biological Station, 16 May 1988 (M. Deyrup), sifted from sand, Florida scrub habitat; 1 worker: Highlands Co. Sebring, 11 Mar. 1987 (M. Deyrup), Red Water Lake, Florida scrub habitat; 2 workers: Highlands Co., Sebring 17 Sep. 1990 (M. Deyrup), Flamingo Villas development, Florida scrub habitat; 10 workers (callows, nest series): Marion Co., 16 Oct. 1990 (M. Deyrup), Ocala Waterway development, Florida scrub habitat; 3 workers: Alachua Co., 5.5 miles west of Gainesville (L. Davis), in soil beside rotten pine log, open oak woodland, 22 Mar. 1992; 6 workers: Highlands Co., Placid Lakes Development (M. Deyrup), 1 Jan. 1997, Florida scrub habitat, collector's yard, root mat below *Quercus inopina*.

Deposition of paratypes: 4: Museum of Comparative Zoology, Harvard University; 5: National Museum of Natural History, Smithsonian Institution, Washington, D.C.; 5: Florida State Collection of Arthropods, Gainesville; 5: The Natural History Museum, London; 4: Los Angeles County Museum of Natural History; 3: collection of Gary Umphrey, London, Ontario; 2 paratypes: collection of Mark Dubois, Washington, Illinois; 2: collection of Kye Hedlin, Raleigh, North Carolina; 2: collection of William MacKay, El Paso, Texas; 5: collection of Lloyd Davis, Gainesville, Florida; 17: Arthropod Collection, Archbold Biological Station.

Etymology. This species is named in honor of Dr. Gary Umphrey, in recognition of his long labors working to elucidate the taxonomy and phylogeny of the intractable *A. rudis* group.

DISCUSSION

Although we have known of specimens of an aberrant *Aphaenogaster* for almost nine years, we were wary about assigning them to a new species because of the notorious intraspecific variation within the genus, and the resulting history of synonymy. Our hypothesis was that there might be a southern isolate of *fulva* that differed in various ways from northern forms, and it was not until we had a good series of the new species from within the range of *fulva* in north Florida (Fig. 3) that this hypothesis became untenable. We had also hoped to find many more colonies, and associated sexuals, though these aims still elude us. Meanwhile, we gathered specimens of *fulva* from much of its range, so that variation within that species is now clearer to us.

The evidence that we use to establish the species-level distinctness of *umphreyi* is as follows: 1. *A. umphreyi* is sympatric with *fulva*, at least in Putnam and Marion Counties, and probably farther north as well, so *umphreyi* is not likely to be a geographic subspecies of *fulva*. 2. There is no overlap in the following structural character states used to distinguish the new species: relatively small eyes (Fig. 4); relatively small propodeal spines; heavy zigzag cari-

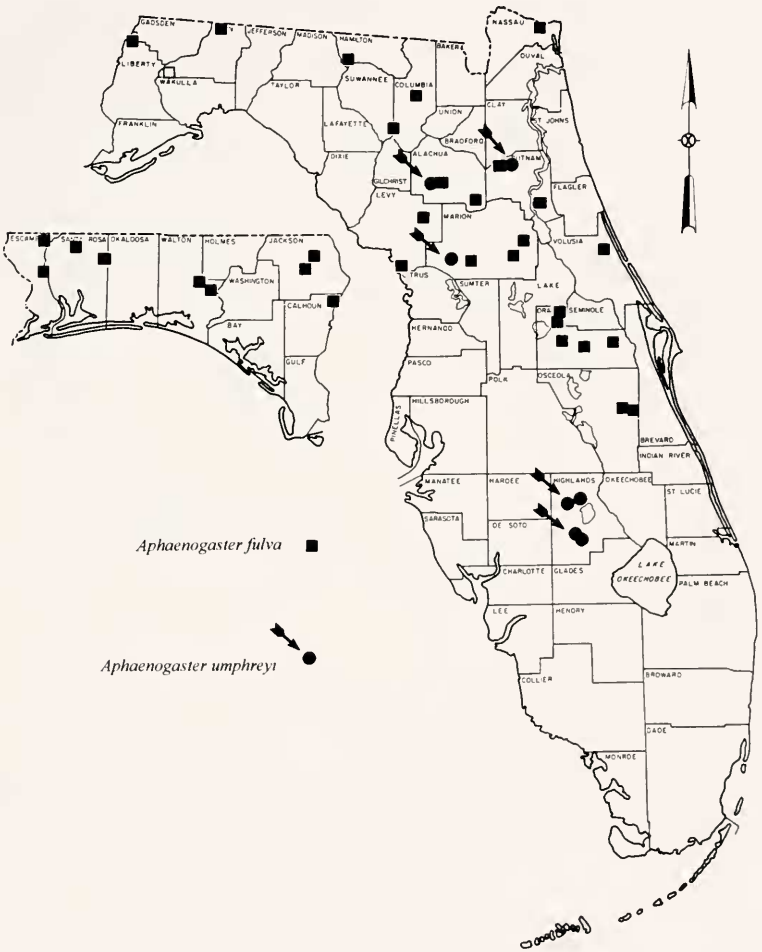

Figure 3. Collection sites for *Aphaenogaster umphreyi* and *A. fulva* in Florida.

nae on the sides of the pronotum and on the propodeum; reduced spurs on the middle and hind tibiae. 3. The occurrence of *umphreyi* in xeric habitats, while *fulva* (at least in the southeast) is in mesic, often wet sites. 4. The kinds of morphological differences between the two species go far beyond the kinds of intraspecific variation that seem to be directly influenced by environmental conditions in different habitats (e.g.: in xeric habitats *Pheidole dentata* Mayr seems paler, *Odontomachus brunneus* (Patton) paler and smaller).

The evidence available suggests that *umphreyi* and *fulva* are a closely related species pair. They share exclusively the following character states: coarse sculpture on the head and mesosoma; upward-pointing propodeal spines; strongly elevated, notched anterior edge of the mesonotum. This combination of features brings *umphreyi* out to couplet 18 in Creighton's key (1950) to *Aphaenogaster*, but the short propodeal spines produce an impasse.

Color is not a very reliable character in *fulva*; it is generally dark brown, but we have seen reddish specimens, particularly from its western range. It

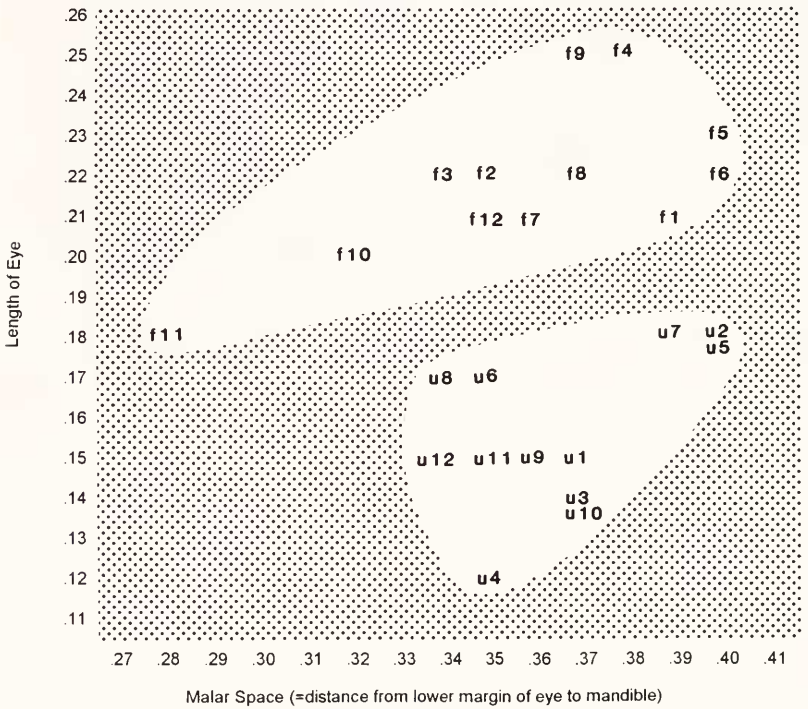

Figure 4. Malar space and eye length in *Aphaenogaster umphreyi* (u), representing 10 colonies, and *A. fulva* (f), representing 12 Florida colonies.

would still be useful to check reddish brown individuals assigned to *fulva* in collections to see whether they have smaller eyes and the other characteristics of *umphreyi*. We have provisionally identified as *umphreyi* a pair of pale specimens with small eyes collected in Decatur County, Georgia, but have not included them among the paratypes because they are small specimens with much less conspicuous rugae than normal in *umphreyi*; these specimens are in the Museum of Comparative Zoology, Harvard University.

The reduced hind and middle tibial spurs of *umphreyi* are quite variable. In some specimens they are absent, in others they are present, but short. The hind tibial spurs, when present, are shorter than the middle tibial spurs. The hind tibial spurs in *Aphaenogaster* as a whole are remarkably expressive, compared with most ant genera. In *A. floridana* Smith they are broad and abruptly acuminate. In *A. pallida* (Nylander), which also has very small eyes, they are extremely reduced. In *A. flemingi* Smith, the hind tibial spurs are somewhat reduced, shorter than the middle tibial spurs. In *A. tennesseensis* (Mayr), they are much reduced, thick, and sometimes curved. In *A. sardoa* Mayr, and *A. senilis* Mayr, the basal third is noticeably swollen. In *A. campana* Emery, they are bristle-like. In *A. cockerelli* Andre, they have apparently been lost, and replaced by enlarged lateral bristles. *Aphaenogaster fulva* and several other species have evenly tapering spurs. Nobody knows, of course, what ecological and evolutionary factors are affecting tibial spur morphology, but a study of the habits of *umphreyi* and other species that have unusual spurs might help us understand the function of tibial spurs in ants.

Aphaenogaster umphreyi may be almost entirely subterranean in habits, and if it does emerge, it may do so at night. All the specimens were collected underground, either in sand under a thick layer of dead leaves and roots, or under piles of litter and trash. The senior author has spent hundreds of hours over the last 14 years prowling scrub habitat at the Archbold Biological Station, without seeing a single specimen of *umphreyi* in the open. The small eyes and pale color of *umphreyi* are consistent with a subterranean life.

There are no sexuals associated with workers of *umphreyi*, but we believe that we may have collected an unassociated queen. Carroll (1975) states that queens of *fulva* are easily distinguished by the "heavily rugose mesothoracic episternite and sternite." The worker-associated queens we have seen from Florida, South Carolina, Maryland, and Arkansas seem to agree with this description, the rugosity consisting of long, gently undulating longitudinal rugae on a granulate background. We have one dealate queen from Archbold Biological Station (where *fulva* is unknown) that has zigzag rugae on the mesothoracic episternite and reduced spurs on the hind and middle tibiae. The eyes and propodeal spines are not reduced. The specimen was collected in a window trap in Florida scrub habitat in November, 1987.

Nothing is known about *umphreyi* other than it is a subterranean inhabitant

of sandy uplands of the southeast, it is difficult to collect, and it appears to be closely related to *fulva*. We have no long series showing intraspecific variation, no associated sexuals, no details of its geographic range, and no information on diet or behavior. Until myrmecologists develop an effective method for finding colonies, this will remain one of our most obscure species of *Aphaenogaster*.

ACKNOWLEDGMENTS

We thank Gary Umphrey (University of Western Ontario) and Stefan Cover (Harvard University) for reviewing drafts of this paper. We thank Stefan Cover for arranging the loan of specimens from the Museum of Comparative Zoology, Harvard University, and Walter Suter, Zachary Prusak, and David Corey for contributing specimens of *Aphaenogaster fulva*, and Fabrizio Rigato for contributing specimens of several species of European *Aphaenogaster*. We thank our wives, Nancy and Marie, for waiting patiently whenever we left them by the roadside and went off into the woods for "a few minutes" of ant collecting.

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